3

Dredging and dumping

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More than 99% of the sediments that are dumped at sea derive from dredging in ports and fairways. Between 1990 en 2007 the total amount of dumped materials at sea in the OSPAR region fluctuated between 80 and 130 million tons (dry weight). About 90% of all dredged sediments are dredged and dumped in the Southern part of the North Sea. This is largely due to the maintenance of the fairways to big ports such as Hull, Antwerp, Rotterdam, Hamburg and Esbjerg. In 2007, Germany and France were the leaders of the OSPAR region with regard to dumping sediments in the sea, with 27.775 million tons and 24.402 million tons (dry weight) respectively (*OSPAR QSR 2010* [198817]). In Belgium, 10.066 million tons (dry weight) have been dumped in 2010 (*Lauwaert et al. 2011* [210175]). The evolution of the amount of dumped sediment in the Belgian Part of the North Sea (BNS) has been recorded since 1991 (*table dredged material* - The Management Unit of the North Sea Mathetical Models MUMM (RBINS)). In the future, the amount of dredged and dumped sediments will probably increase, due to the growing vessel size and the associated widening and deepening of fairways (*OSPAR QSR 2010* [198817]). In this text, the focus is on the dredging and dumping activities in the BNS. The specific situation of these activities in the Scheldt estuary is discussed in the text about the Scheldt Estuary.

3.1 Policy context

The maintenance and deepening of the maritime access channels to ports and the maintenance of the depth in the ports is a competence of the Flemish Region. The Department of Mobility and Public Works (MOW), *Maritime Access Division*, is responsible for the fairways and for the Port of Zeebrugge (except for the dredging of commercial piers, where the works, performed by the Maritime Access Division, are financed by *Maatschappij van de Brugse Zeevaartinrichtingen N.V.*), while the Agency for Maritime and Coastal Services (MD&K), *Coastal Division*, is responsible for the maintenance of the Flemish marinas of Ostend, Blankenberge and Nieuwpoort. However, the competence with regard to the dumping of dredged material at sea is a federal matter. Hence, the management of dredged material in Belgium is a shared competence, for which a cooperation agreement was concluded (12 June 1990) between the Flemish Region and the federal State, as modified by the *cooperation agreement of 6 September 2000*.

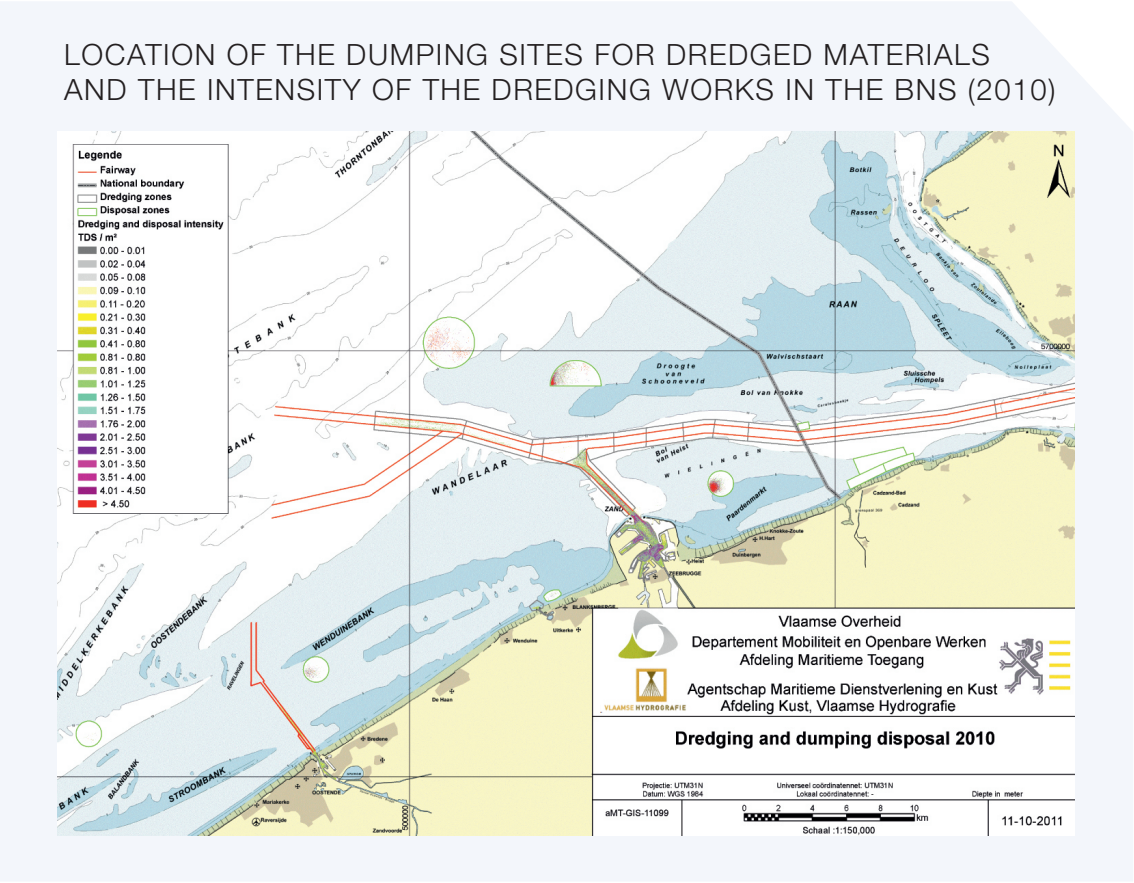

Figure 1. The location of the dumping sites for dredged materials and the intensity of the dredging works in the BNS in 2010 (*Lauwaert et al. 2011* [210175]).

3.2 Spatial use

The majority of dredging activities in Belgium take place in the Port of Zeebrugge and its channel (*Pas van het Zand*), in the fairway to the Western Scheldt (*Scheur*), and in the Sea Scheldt between the Belgian-Dutch border and the Deurganck dock (see theme **Scheldt Estuary**). In the BNS, five official dumping sites have been demarcated: *Bruggen en Wegen* Zeebrugge Oost, Oostende, Nieuwpoort, S1 and S2 (figure 1) (*Lauwaert et al. 2011* [210175]).

The procedure for obtaining a permit to dump dredged materials at sea has been stipulated by the *Royal Decree of 12 March 2000*. The maximum amount of dredged material and the location of the dredging and dumping sites of the permits that have been granted to the Maritime Access Division and to MD&K, can be found in several Ministerial Decrees (see *Belgisch Staatsblad*).

In the draft of the Marine Spatial Plan (*Ontwerp van koninklijk besluit tot vaststelling van het marien ruimtelijk plan* [227527]), as proposed by the Minister competent for the North Sea, certain spatial policy choices have been formulated concerning dredging and dumping. In this draft, the actual dredging locations are safeguarded with a view to safe maritime access and in relation with the evolution of ships. In order to prevent intensive use of certain locations and reflux of the material, a reservation zone has been demarcated as an alternative dumping site.

3.3 Societal interest

The Flemish ports are important economic gateways (see theme **Martime transport, shipping and ports**). Because of the increase in scale of the ships, it is necessary to regularly maintain the channels to the ports and to deepen and widen these fairways (this is connected to the developments in shipping in the Hamburg-Le Havre range). Each year, the Flemish government invests about 200 million euros to safeguard the accessibility of the ports (including the Scheldt Estuary, figure 2, Source: *Flemish Port Commission*). The accessibility of the Flemish ports of Ostend, Zeebrugge, Ghent and Antwerp is guaranteed by the *Martime Access Division* of the MOW department. The tasks of this department include maintenance dredging works, wreck salvage, deepening of the channels and sludge processing (also see *Decision of the Flemish government of 13 July 2001*). The *Ministerial Decrees of 28 December 2011* granted 4 permits for the dumping of 26.450 million tons of dry matter, at 4 dumping sites in the BNS to the

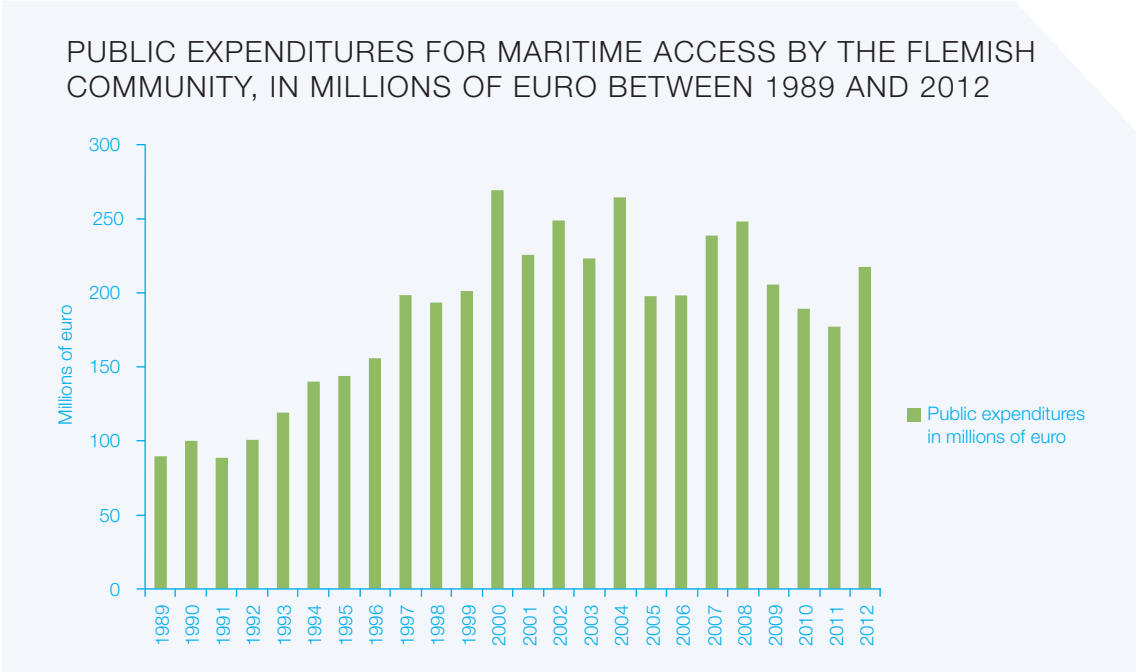

Figure 2. Public expenditures for maritime access by the Flemish Community, in millions of euro between 1989 and 2012 (in prices of 2012). Note: modifications may still happen through *Financieringsfonds voor schuldafbouw en eenmalige investeringsuitgaven* **(Source: *Flemish Port Commission*, after: Flemish Community, MOW Department, Maritime Access Division).**

Maritime Access Division from 1 January 2012 until 31 of December 2013. In addition, the Agency for Maritime and Coastal Services was allowed 3 permits for the dumping of 1,850,000 tons of dry matter in total. Both permit holders together dumped 11,910,431 and 10,066,736 tons of dry matter in 2009 and 2010 respectively.

A study by the Flanders Marine vzw (*haalbaarheidsstudie (2010)* [205773]) reveals that 2.9% of the total direct employment (50,195 jobs) in the marine/maritime sector in the Flanders region was situated in the dredging sector in 2008.

3.4 Impact

The most common type of dredging ship is the trailing suction hopper dredger. This ship is equipped with big suction pipes and a large dredge drag head that function as an enormous hoover tube, sucking the sediment out of the channels. In this process the sediment is removed until the minimum guaranteed nautical depth is achieved, including a small margin (maximum 30 cm on average over the entire channel) to anticipate sudden sedimentation. The sediment ends up in the cargo hold of the ship and can be dumped at the licensed dumping sites (or taken ashore in certain cases) by opening the doors or slides. The impact of dredging and dumping activities on the marine environment is of a physical, chemical and biological nature. (*Lauwaert et al. 2011* [210175] and table 1). The impact of dredging and dumping activities on other users is discussed in *Verfaillie et al. 2005* [78299] (*GAUFRE project BELSPO*).

Table 1. An overview of the environmental effects of dredging and dumping activities.

ENVIRONMENTAL IMPACT	LITERATURE
Physicochemical impact: changes of the seabed morphology and composition (grain size) and the sedimentological effects (sediment plumes, turbidity, release of pollutants, etc.)	*Lauwaert et al. 2002* [25571], *Seys 2002* [214470], *Fettweis et al. 2003 (MOMO)* [110922], *Fettweis et al. 2004a (MOMO)* [110923], *Fettweis et al. 2004b (MOMO)* [110969], *Lauwaert et al. 2004* [111007], *Fettweis et al. 2005a (MOMO)* [110962], *Fettweis et al. 2005b (MOMO)* [110921], *Verfaillie et al. 2005* [78299] (*GAUFRE project BELSPO*), *Fettweis et al. 2006a (MOMO)* [107892], *Fettweis et al. 2006b (MOMO)* [137709], *Lauwaert et al. 2006* [96485], *Fettweis et al. 2007a (MOMO)* [113770], *Fettweis et al. 2007b* [115401] (*MOCHA project BELSPO*), *Goffin et al. 2007* [114225], *Du Four & Van Lancker 2008* [203866], *Fettweis et al. 2008a (MOMO)* [119293], *Fettweis et al. 2008b (MOMO)* [122757], *Lauwaert et al. 2008* [130875], *Fettweis et al. 2009a (MOMO)* [199633], *Fettweis et al. 2009b (MOMO)* [199631], *Fettweis et al. 2009c (MOMO)* [144454], *Lauwaert et al. 2009* [144191], *Van Hoey et al. 2009* [143498], *Fettweis et al. 2010 (MOMO)* [197423], *André et al. 2010* [200613], *Fettweis et al. 2011a (MOMO)* [202998], *Fettweis et al. 2011b (MOMO)* [206659], *Fettweis et al. 2011c* [200595], *Lauwaert et al. 2011* [210175], *Fettweis et al. 2012 (MOMO)* [217195], *Fettweis et al. 2013 (MOMO)* [222062]
Biological impact: effects on the fauna and flora (benthos disturbances, impact of released pollutants, etc.)	*Seys 2002* [214470], *Lauwaert et al. 2002* [25571], *Lauwaert et al. 2004* [111007], *Verfaillie et al. 2005* [78299] (*GAUFRE project BELSPO*), *Lauwaert et al. 2006* [96485], *Lauwaert et al. 2008* [130875], *Lauwaert et al. 2009* [144191], *Van Hoey et al. 2009* [143498], *André et al. 2010* [200613], *Lauwaert et al. 2011* [210175]

3.5 Sustainable use

In order to tackle the impact on the marine environment of the dumping of dredged materials, this activity is globally governed by the *The London Convention (1972)*, and the *London Protocol (1996)* about the pollution due to dumping material at sea. In our region, these activities are also covered by the *OSPAR convention (1992)*, which aims to protect the marine environment in the Northeastern part of the Atlantic Ocean (including the North Sea). *OSPAR* also issued guidelines for the sustainable use of dredged materials (*OSPAR Guidelines for the management of Dredged Material 2009* [226539]).

On the European level, the *Water Framework Directive* (WFD) and the *Marine Strategy Framework Directive* (MSFD) indentify the changing concentration of sediments in the water column due to human intervention as one of the important pollutants. In the *MSFD* some of the descriptors for a good environmental status (GES) are relevant for dredging and dumping: the seafloor integrity (more information: *Rice et al. 2010* [202490]), underwater noise and other

forms of energy (more information: *Tasker et al. 2010* [202493]), contaminants and pollution effects (more information: *Law et al. 2010* [202492]) and the permanent alteration of the hydrographical conditions. In the *MSFD*, changes in siltation due to dredging and dumping activities are incorporated in the list of pressures and impacts. The implementation of the *MSFD* in Belgian legislation is provided by the *Royal Decree of 23 June 2010*. The environmental targets and indicators per descriptor for the BNS are elaborated in the following publication: *de Omschrijving van de Goede Milieutoestand & vaststelling van Milieudoelen voor de Belgische mariene wateren (2012)* [220232] (see theme **Nature and environment**). In addition, the *Birds Directive* (*2009/147/EC*) and the *Habitats Directive* (*92/43/EEC*) constitute an important framework for the reduction of the impact of dredging and dumping activities, given the obligation of assessment before the execution of a project.

In the BNS, dredging and dumping is governed by the *law of 20 January 1999*. The *Royal Decree of 12 March 2000* stipulates that a synthesis report must be presented every 2 years to the competent minister. In this report the effects of the dredging and dumping activities are discussed, and recommendations supporting the development of a stronger environmental policy are formulated (synthesis reports: *Lauwaert et al. 2002* [25571], *Lauwaert et al. 2004* [111007], *Lauwaert et al. 2006* [96485], *Lauwaert et al. 2008* [130875], *Lauwaert et al. 2009* [144191], *Lauwaert et al. 2011* [210175]). Moreover, the dredged material that is dumped needs to meet certain sediment quality criteria (*website BMM*, *Goffin et al. 2007* [114225], *OSPAR national action levels for dredged material 2008* [226538]). If the limits of three criteria are exceeded, the dredged material cannot be dumped in the sea. If the result of the analysis is situated between the target value and the limit, further analysis is required. About every 10 years, a large-scale monitoring programme is established to determine the sediment quality of dredging areas (*website MUMM*).

Holders of a permit are subject to a monitoring and scientific programme. Within the MOMO-programme, MUMM does the monitoring and modelling of the cohesive sediment transport, and evaluates the effects on the marine ecosystem as a consequence of dredging and dumping operations (see *inter alia* *Fettweis et al. 2013 (MOMO)* [222062]). The Institute for Agricultural and Fisheries Research (*ILVO*) investigates the biological and chemical aspects and intends to optimise the monitoring programme.

Legislation reference list

Table with international agreements, conventions, etc.

INTERNATIONAL AGREEMENTS, CONVENTIONS, ...			
Abbreviations (if available)	Title	Year of conclusion	Year of entering into force
The *London Convention*	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	1972	1975
The London Protocol	Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	1996	2006
The *OSPAR Convention*	Convention for the protection of the Marine Environment of the North-East Atlantic	1992	1998

Table with European legislation. The consolidated version of this legislation is available on *Eurlex*.

EUROPEAN LEGISLATION			
Abbreviations (if available)	Title	Year	Number
Directives			
Habitats Directive	Directive on the conservation of natural habitats and of wild fauna and flora	1992	43
Water Framework Directive	Directive establishing a framework for Community action in the field of water policy	2000	60
Marine Strategy Framework Directive	Directive establishing a framework for Community action in the field of marine environmental policy (Marine Strategy Framework Directive)	2008	56
Birds Directive	Directive on the conservation of wild birds	2009	147

Table with Belgian and Flemish legislation. The consolidated version of this legislation is available on *Belgisch staatsblad* and the *Justel-databases*.

BELGIAN AND FLEMISH LEGISLATION	
Date	Title
Laws	
Wet van 20 januari 1999	Wet ter de bescherming van het mariene milieu in de zeegebieden onder de rechtsbevoegdheid van België
Royal Decrees	
KB van 12 maart 2000	Koninklijk besluit ter definiëring van de procedure voor machtiging van het storten in de Noordzee van bepaalde stoffen en materialen
KB van 23 juni 2010	Koninklijk besluit betreffende de mariene strategie voor de Belgische zeegebieden
Ministerial Decrees	
MB van 28 december 2011	Machtiging voor het storten van baggerspecie bij ministeriële besluiten van 28 december 2011
Other	
Samenwerkingsakkoord van 12 juni 1990	Samenwerkingsakkoord tussen de Belgische Staat en het Vlaamse Gewest ter vrijwaring van de Noordzee van nadelige milieu-effecten ingevolge bagger-specielossingen in de wateren die vallen onder de toepassing van de Conventie van Oslo

BELGIAN AND FLEMISH LEGISLATION (continuation)	
Date	Title
Samenwerkingsakkoord van 6 september 2000	Samenwerkingsakkoord tot wijziging van het Samenwerkingsakkoord van 12 juni 1990 tussen de Belgische Staat en het Vlaamse Gewest ter vrijwaring van de Noordzee van nadelige milieu-effecten ingevolge bagger-specielossingen in de wateren die vallen onder de toepassing van de Conventie van Oslo.
Besluit van de Vlaamse Regering van 13 juli 2001	Besluit van de Vlaamse Regering betreffende de aanduiding van de maritieme toegangswegen en de bestanddelen van de haveninfrastructuur